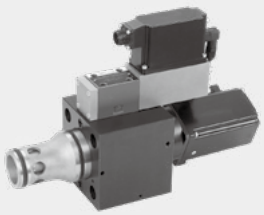
6.9

2-way high-response proportional cartridge valve, pilot operated

Type 2WRCE...L1X

NG 25 to 100
Max. pressure 420 bar
Nominal flow 8000 L/min



Contents

Features

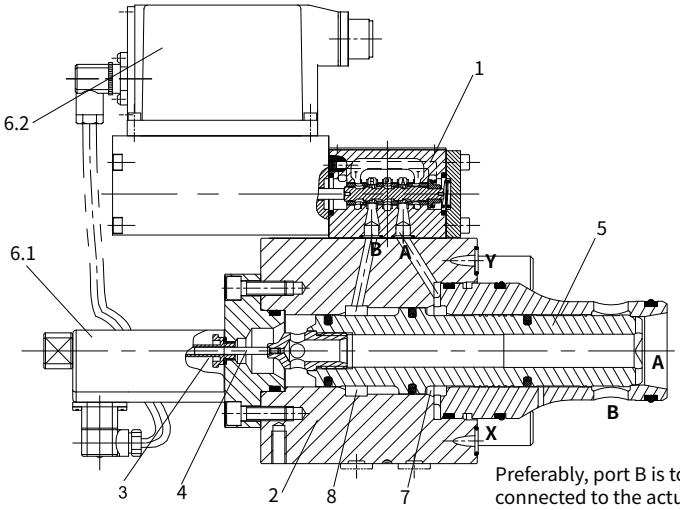
-Pilot operated 2-way high-response valve in block installation design
-Suitable for closed-loop controlling of position, pressure, force and velocity
-Pilot control valve (pilot): Directly actuated controlled directional valve, with control spool and sleeve in servo quality
-Main stage: closed-loop position controlled
-Integrated open and closed-loop control electronics (OBE)
-Typical applications:
· Plastic injection machines
· Die-casting machines
· Ceramics machines

Function and configuration

Valves of type 2WRCE...-L1X/P... are 2-stage high-response valves.
They control the quantity and direction of a flow and are mainly used in control loops.

Set-up:
They consist of the following assemblies:
– The pilot control valve (1) as 1-stage proportional valve (pilot),
with a solenoid as electro-mechanical converters and a piston that is connected to the integrated pilot electronics via electrical feedback (6.2).
– The second stage (2) for flow control.
– An inductive position transducer (3) the core (4) of which is attached to the piston (5) of the second stage.
– Integrated LVDT electronics (6.1).

Type 2WRCE40...-L1X/P

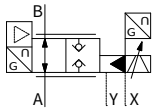


Function
The integrated electronics (OBE) compares command and actual values and the solenoids of the pilot control valve are actuated with a proportional current according to the control deviation.
The pilot control valve takes a proportionally controlled position and controls the flow in and out of the control chambers A (7) and B (8) that actuate the main spool (5) through the closed valve control loop up to 0 control deviation.
This means that the stroke of the main spool is regulated proportionally to the command value. It must be noted that the flow also depends on the valve pressure drop.

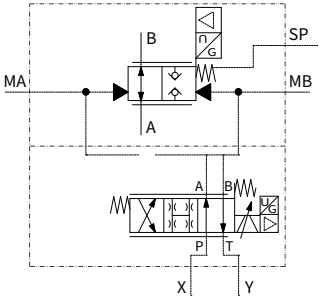
Symbols

2WRCE..-L1X/PL...

Simplified:



Detailed:



2WRCE..-L1X/PK...

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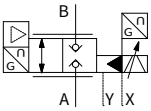

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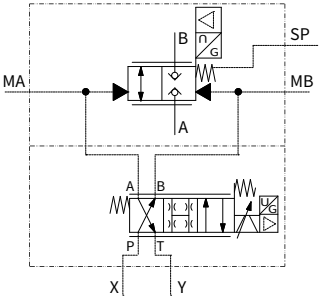

2WRCE..-L1X/PWL...

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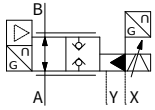

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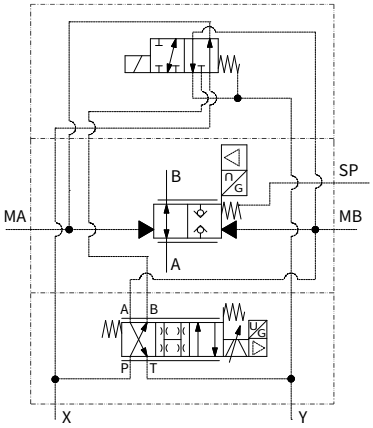
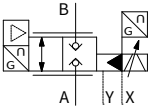
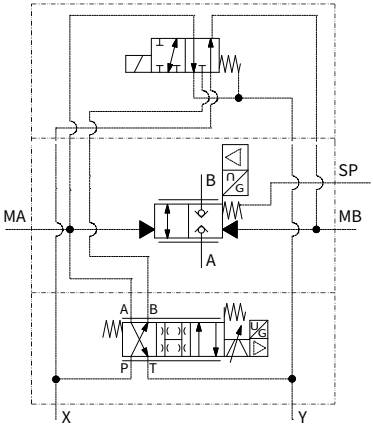


2WRCE..-L1X/PWK...

Simplified:



Detailed:



Ordering code

2	WRC			S		– L1X	/	P			/		/	*

Two-way directional valve = 2

High-response
proportional cartridge valve = WRC

With integrated electronics (OBE) = E

Size 25 = 25
Size 32 = 32
Size 40 = 40
Size 50 = 50
Size 63 = 63
Size 80 = 80
Size 100 = 100

Seat piston = S

Rated flow in L/min at 5 bar valve pressure drop		
Size	Type ...S...L (linear)	Type ...S...R (linear with progressive fine control range)
25	500 =500	-
32	800 =800	600 =600
40	1200 =1K2	850 =850
50	2000 =2K0	1400 =1K4
63	3600 =3K6	3200 =3K2
80	4500 =4K5	3900 =3K9
100	8000 =8K0	6800 =6K8

Characteristic curve form
Linear = L
Linear with progressive fine control range = R

Series L10 to L19 = L1X
(L10 to L19: Unchanged installation and connection dimensions)

The pilot valve is a proportional solenoid driven proportional servo valve =P

Sandwich plate shut-off valve:
Without shut-off valve, de-energized pilot control valve actively "closes"
WRCE with applied pilot pressure =K
Without shut-off valve, de-energized pilot control valve actively "opens"
WRCE with applied pilot pressure =L
With shut-off valve, de-energized shut-off valve actively "closes"
WRCE with applied pilot pressure =WK
With shut-off valve, de-energized shut-off valve actively "opens"
WRCE with applied pilot pressure =WL

Spool position monitoring:
Without safety valve and position switch = No code
With safety valve and position switch = E

Electrical interface:
Command value 0~10V (only with integrated electronics (OBE) "E") = A1
Command value 4~20mA (only with integrated electronics (OBE) "E") = F1

Seal material: FKM seals = V NBR seals = No code

Enable signal control: Without band enable =No code Band enable =Q

Further details in the plain text

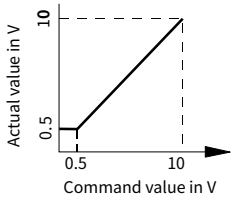
Technical data

General									
Size			25	32	40	50	63	80	100
Weight	Without shut-off valve .../...K or .../...L	kg	8.5	11.2	17.3	24.6	47	74	110
	With shut-off valve .../...WK or .../...WL...	kg	9.8	12.5	18.6	25.9	60	87	123
Size of the pilot control valve (pilot)		NG	6						
Installation position			Any, preferably horizontal						
Storage temperature range		°C	–20 to +80						
Ambient temperature range		°C	–20 to +50						
Sine test according to EN 60068-2-6			10 to 2000Hz/ max. of 10g/ 10 cycles/ 3 axes						
Noise test according to EN 60068-2-64	Size (NG) 25-40		20 to 2000Hz/ 10gRMS /30 g peak /30min /3 axes						
	Size (NG) 50-100		20 to 2000Hz/ 10gRMS /30 g peak /24h /3 axes						
Transport shock according to EN 60068-2-27			15g/ 11ms/ 3 axes						

Hydraulic (measured with HLP32, ϑ_{oil}=40°C ±5°C)									
Maximum operating pressures	Main stage ports A, B	bar	420						
	Pilot control valve port X	bar	315						
	Pilot control valve port Y	bar	35						
Rated flow at Δp = 5 bar	Design ...S...L (linear)	L/min	500	800	1200	2000	3600	4500	8000
	Design ...S...R (linear with progressive fine control range)	L/min	-	600	850	1400	3200	3900	6800
Nominal flow of pilot valve at Δp=70 bar		L/min	12	12	40	40	100	100	100
Leakage of pilot valve at P = 100 bar		L/min	0.3	0.3	0.7	0.7	1	1	1
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524						
Hydraulic fluid temperature range		°C	–20 to +80; preferably +40 to +50						
Viscosity range		mm^2/s	20 to 380; preferably 30 to 45						
Max. permissible degree of contamination of the pressure fluid is to IS0 4006 (c).	Pilot control valve		Class 18/16/13						
	Main valve		Class 20/18/15						
Hysteresis		%	⩽ 0.2						
Range of inversion		%	⩽ 0.1						
Response sensitivity		%	⩽ 0.1						
Response time 0 ~ 100% step signal		ms	25	28	30	30	35	40	50

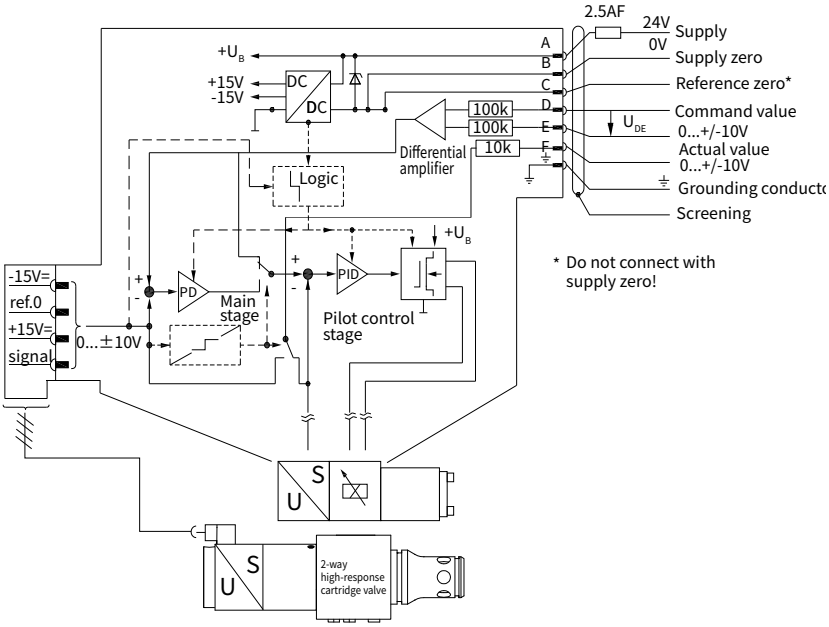
Electric			
Voltage type			Direct voltage
Type of signal			Analog
Opening point calibration		%	⩽ 1
Zero shift upon change of:	– Hydraulic fluid temperature	%/10 K	⩽ 0.3
	– Pilot pressure in X	%/100 bar	⩽ 0.7
	– Return flow pressure in Y	%/bar	⩽ 0.3
Protection class of the valve according to EN60529			IP65 with mating connector mounted and locked

Nominal command value range for 2WRCE:
0 to +10 V ≙ 0 to 100%
In the command value range of 0 to 0.5 V, the actual value remains constant at 0.5 V.
In case of a slow command value modification from 0.5 V to +10 V, the actual value follows the command value within ±0.15 V.

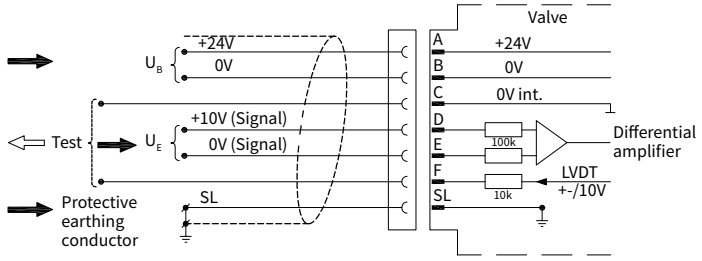


Integrated electronics (OBE)

Block diagram/Pinout
Version A1: U_{D-E} 0...±10V

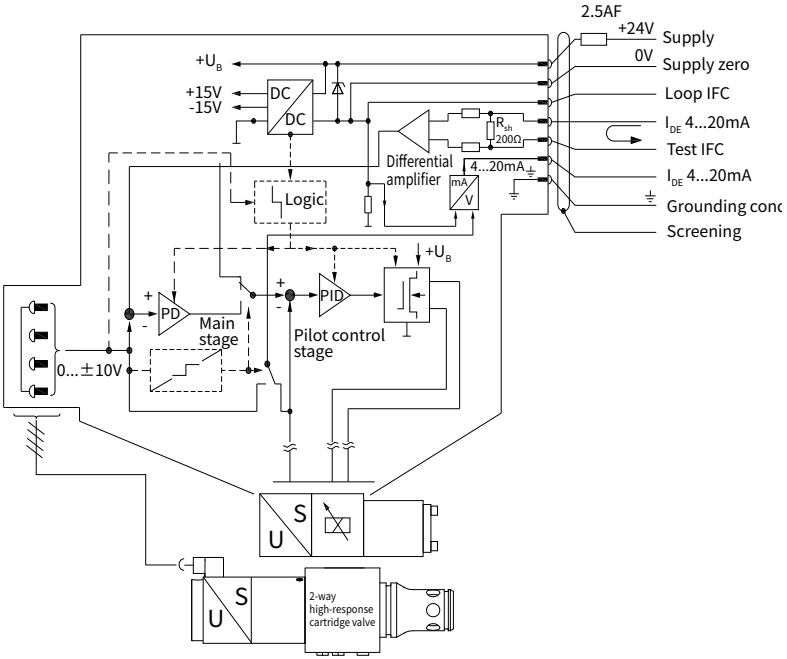


Pin assignment 6P+PE
Version A1: U_{D-E} 0... +10V

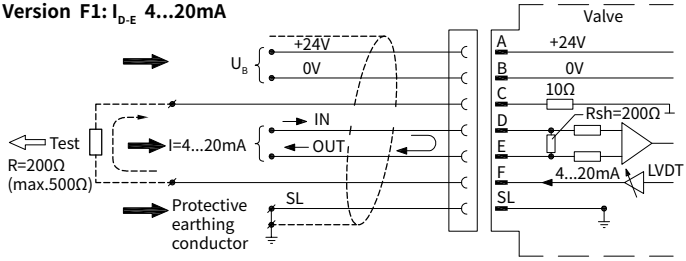


Integrated electronics (OBE)

Block diagram / Pinout
Version F1: I_{D-E} 4...20mA

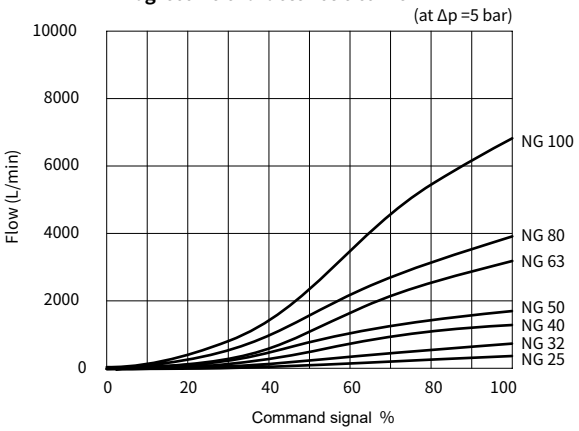


Pin assignment 6P+PE
Version F1: I_{D-E} 4...20mA

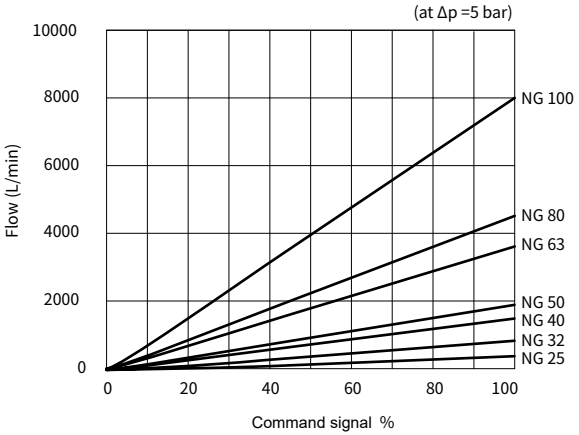


Characteristic curves (measured with HLP46, ϑ_{oil}=50°C , ΔP=5bar)

Progressive characteristic curve



Linear characteristic curve



Opening point factory set to 3 %

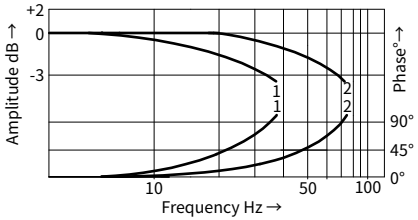
Opening point factory set to 3 %.

Flow at different Δp: $Q_{actual} = Q_{nominal} \cdot \sqrt{\frac{\Delta p_{actual}}{\Delta p_{nominal}}}$

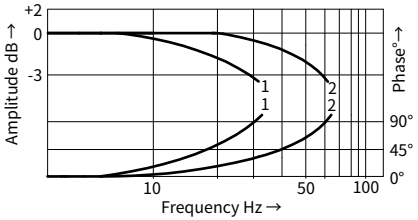
Characteristic curves (measured with HLP46, ϑ_{oil}=50°C , ΔP=5bar)

Bode diagram
(at nominal hydraulic conditions)

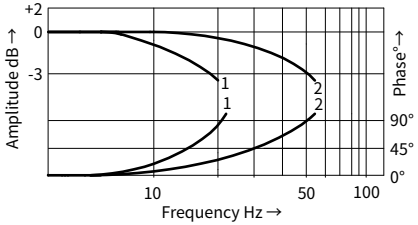
NG 25



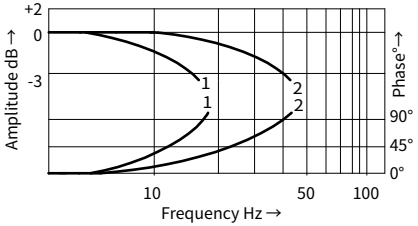
NG 32



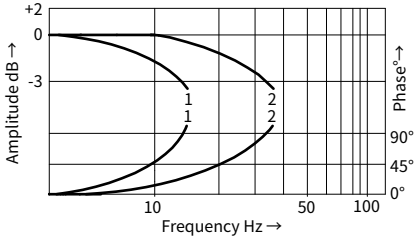
NG 40



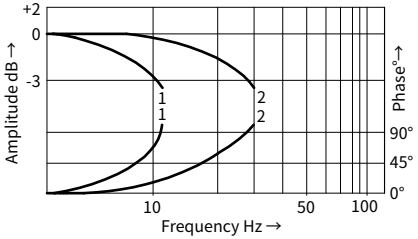
NG 50



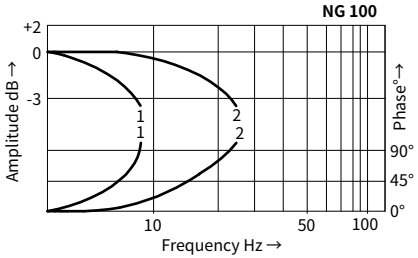
NG 63



NG 80



NG 100

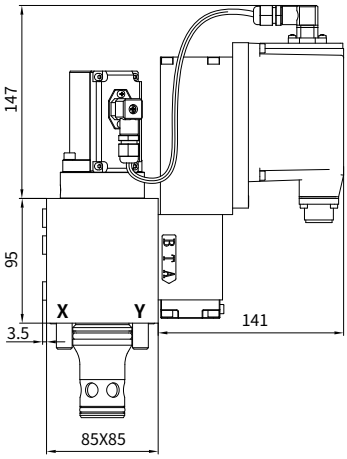


1 = Command value: 10% ↔ 90%
2 = Command value: 50% ± 5%

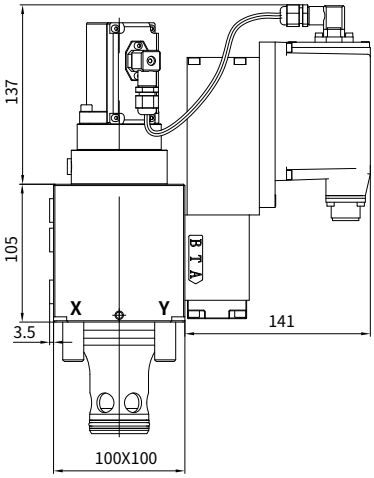
Unit dimensions

(nominal dimensions in mm)

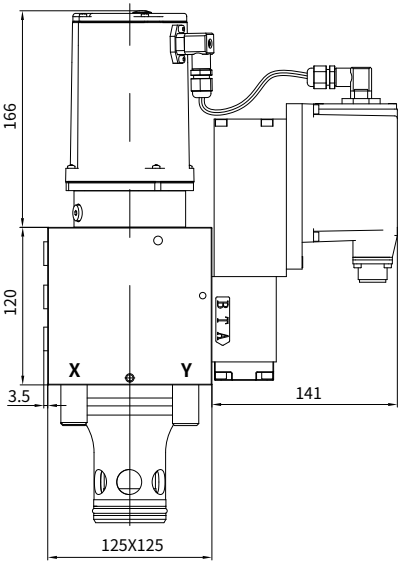
NG 25



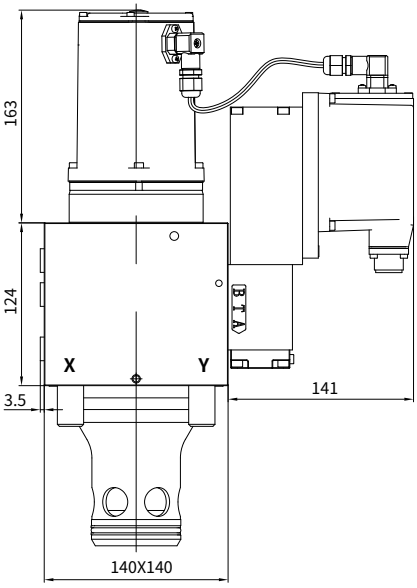
NG 32



NG 40



NG 50



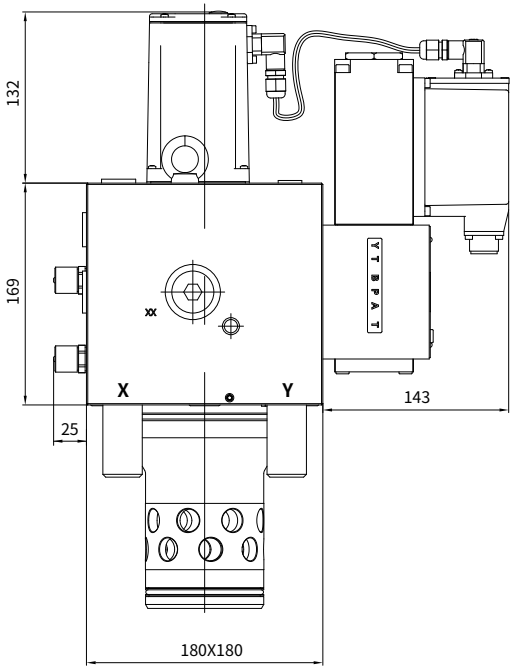
Size	Fastening bolts class 12.9	Tightening torque
25	4 - M12×100	125 Nm
32	4 - M16×60	300 Nm

Size	Fastening bolts class 12.9	Tightening torque
40	4 - M20×70	600 Nm
50	4 - M20×80	600 Nm

Unit dimensions

(nominal dimensions in mm)

NG 63

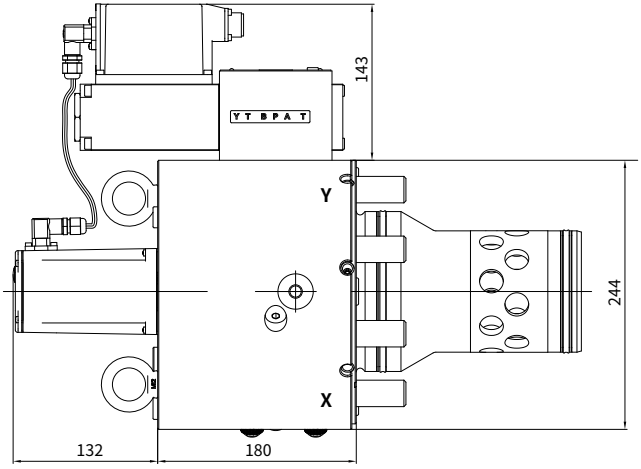


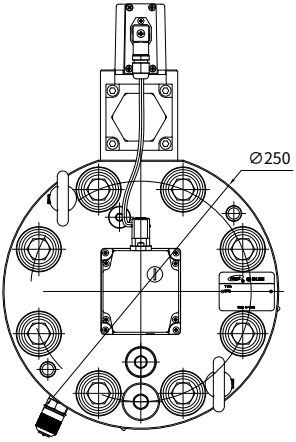
Size	Fastening bolts class 12.9	Tightening torque
63	4 - M30×160	1775 Nm

Unit dimensions

(nominal dimensions in mm)

NG 80



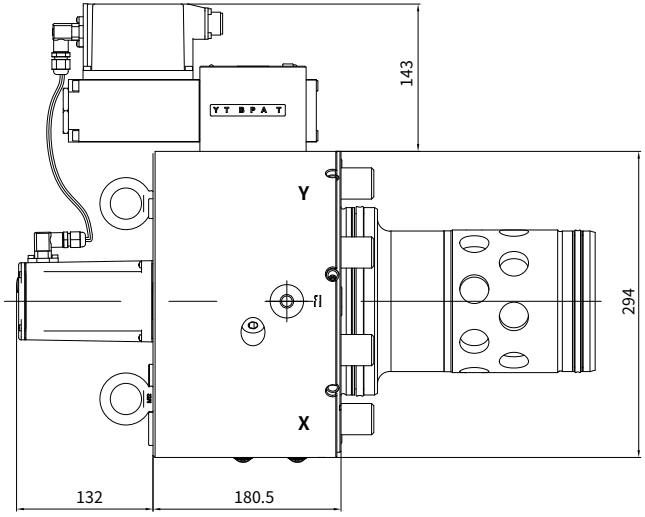


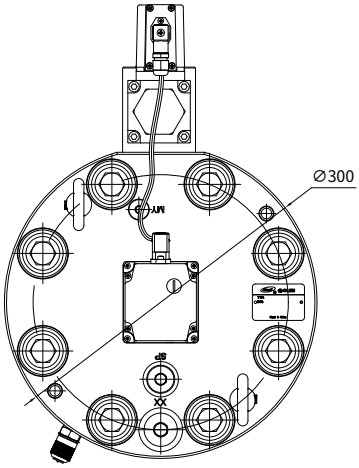
Size	Fastening bolts class 12.9	Tightening torque
80	8 - M24×160	890 Nm

Unit dimensions

(nominal dimensions in mm)

NG 100



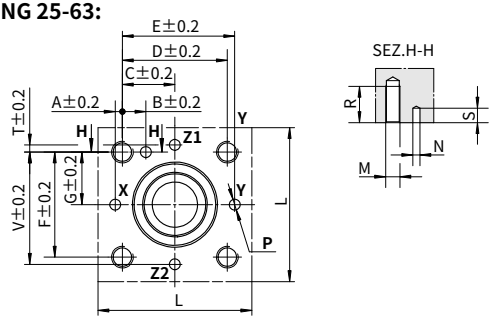


Size	Fastening bolts class 12.9	Tightening torque
100	8 - M30×150	1775 Nm

Installation dimensions according to DIN ISO 7368

(dimensions in mm)

NG 25-63:



Size	25	32	40	50	63	80	100
A	4	6	7.5	8	12.5	-	-
B	13	18	19.5	20	24.5	-	-
C	29	35	42.5	50	62.5	-	-
D	58	70	85	100	125	-	-
E	62	76	92.5	108	137.5	-	-
F	58	70	85	100	125	200	245
G	29	35	42.5	50	62.5	-	-
L_{min}	85	102	125	140	180	250	300
M	M12	M16	M20	M20	M30	M24	M30
ØN	6	6	6	8	8	10	10
$ØP_{max}$	6	8	10	10	12	16	20
R	30	38	46	46	66	50	66
S_{max}	8	8	8	8	8	8	10
T	4	6	7.5	8	12.5	-	-
V	62	76	92.5	108	137.5	-	-
Ød1	45	60	75	90	120	145	180
Ød2	34	45	55	68	90	110	135
$Ød3_{max}$	25	32	40	50	63	80	100
$Ød4_{max}$	27	38.5	54.5	62.5	87	100	120
L1	$58^{+0.1}_{0}$	$70^{+0.1}_{0}$	$87^{+0.1}_{0}$	$100^{+0.1}_{0}$	$130^{+0.1}_{0}$	$175^{+0.2}_{0}$	$210^{+0.2}_{0}$
L2	$72^{+0.1}_{0}$	$85^{+0.1}_{0}$	$105^{+0.1}_{0}$	$122^{+0.1}_{0}$	$155^{+0.1}_{0}$	$205^{+0.2}_{0}$	$245^{+0.2}_{0}$
L3	70	83	102	117	150	200	239
L4	57	68.5	84.5	97.5	127	170.5	205.5
L5	30	30	30	35	40	40	50
L6	2.5	2.5	3	3	4	5	5
L7	2.5	2.5	3	3	4	5	5
U	0.03	0.03	0.05	0.05	0.05	0.05	0.05
W	0.05	0.1	0.1	0.1	0.2	0.2	0.2

NG 80, 100: